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(71)Applicant : WESTVACO CORP
(72)Inventor : PARKS CHRISTOPHER J
MASSOUDA DEBORA F

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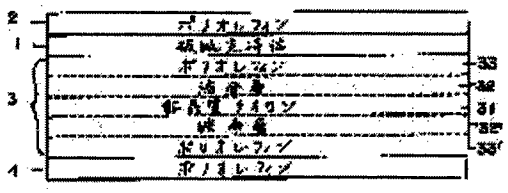
(54) PAPERBOARD LAMINATE AND MANUFACTURING METHOD THEREOF

(57)Abstract:
PURPOSE: To provide a non-foil composite laminate for containers excellent in gas barrier performance.
CONSTITUTION: A composite laminate is constituted of an inner insulation layer consisting of amorphous nylon and an outer surface consisting of a heat sealable olefin polymer. The olefin polymer layer 2 constituting the outer surface of a paperboard support 1 is constituted of a low-density polyethylene. An inner sandwich layer 3 is formed on the inner side of the support 1, and this is constituted of a low-density polyethylene, the first bonding layer, amorphous nylon, the second bonding layer, and a low-density polyethylene. The first and the second bonding layers are composed of an anhydrous modified copolymer having ethylene as a base material. A layer 4 composed of a low-density polyethylene is coated on the surface of the inner sandwich layer 3.



CLAIMS

[Claim(s)]
[Claim 1]A paperboard container comprising:
(a) A paperboard base material.
(b) An olefin polymer layer which is formed in one field of said paperboard base material, and constitutes an outer surface of a container and which can be heat sealed.
(c) An inside sandwich layer which comprises the first joining layer (a first tie layer), an amorphous nylon layer, and the second joining layer, and is formed on a field of another side of said paperboard base material one by one.
(d) It is a product contact surface to an outside surface and the inside comprising an olefin polymer layer which is formed on said paperboard base material of the same side as said inside sandwich layer, and constitutes a product contact surface inside said container, and which can be heat sealed.

[Claim 2]The paperboard container according to claim 1, wherein said inside sandwich layer comprises the first polyolefin layer, said first joining layer, said amorphous nylon layer, said second joining layer, and the second polyolefin layer in order.
[Claim 3]The paperboard container according to claim 2, wherein said inside sandwich layer comprises a low-density-polyethylene polymer layer, said first joining layer, said amorphous nylon layer, said second joining layer, and a low density polyethylene layer.
[Claim 4]The paperboard container according to claim 1, wherein said first and the second joining layer use as an ingredient an anhydride refining copolymer (anhydride modified ethylene-based copolymer) which uses ethylene as a base.
[Claim 5]The paperboard container according to claim 3, wherein said first and the second joining layer use as an ingredient an anhydride refining copolymer which uses ethylene as a base.
[Claim 6]Said inside sandwich layer Low density polyethylene of about 3.25 to 13.00 g/m^2 (2-8 lbs/ream), Said first joining layer of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), Amorphous nylon of about 6.50 to 19.50 g/m^2 (4-12 lbs/ream), and said second joining layer of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), The paperboard container according to claim 3 comprising low density polyethylene of about 3.25 to 13.00 g/m^2 (2-8 lbs/ream).
[Claim 7]It is the independent enveloping layer which simultaneous extrusion of said sandwich layer is carried out, and comprises low density polyethylene of about 8.13 - 24.38g[/m] ^{2} (5-15 lbs/ream) in which said inside product contact surface was formed in the surface of said sandwich layer, The paperboard container according to claim 6, wherein an olefin polymer layer which constitutes an outside surface of said container comprises low density polyethylene of about 9.75 to 29.26 g/m^2 (6-18 lbs/ream).
[Claim 8]The paperboard container according to claim 7, wherein said first and the second joining layer comprise an anhydride refining copolymer which uses ethylene as a base.
[Claim 9]The paperboard container according to claim 5, wherein coverage of said amorphous nylon is about 6.50 to 19.50 g/m^2 (4-12 lbs/ream).

[Claim 10]The paperboard container according to claim 1, wherein said inside product contact surface polymer layer comprises low density polyethylene of about 8.13 to 24.38 g/m^2 (about 5-15 lbs/ream).
[Claim 11]The paperboard container according to claim 1, wherein said olefin polymer layer which constitutes an outside surface of said container comprises low density polyethylene of about 9.75 to 29.26 g/m^2 (about 6-18 lbs/ream).
[Claim 12]The paperboard container according to claim 1, wherein said inside sandwich layer comprises a layer containing amorphous nylon of about 6.50 to 19.50 g/m^2 (about 4-12 lbs/ream).
[Claim 13]Said inside sandwich layer Said first joining layer of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), Amorphous nylon of about 6.50 to 19.50 g/m^2 (4-12 lbs/ream), Abbreviation (the paperboard container according to claim 1 comprising said second joining layer of 3.25-9.75 g/m^2 (2-6 lbs/ream), and low density polyethylene of about 8.13 to 24.38 g/m^2 (5-15 lbs/ream).)
[Claim 14]The paperboard container according to claim 13, wherein said first and the second joining layer use as an ingredient an anhydride refining copolymer which uses ethylene as a base.

[Claim 15]The paperboard container according to claim 1, wherein **** yield strength of said inside sandwich layer is about 281.2 kg/cm^2 (about 4,000 psi) slightly.
[Claim 16]The paperboard container according to claim 1, wherein said inside sandwich layer has the point-of-rupture elongation not more than about 200% or it.
[Claim 17]An outside surface layer comprises low density polyethylene of about 19.50 g/m^2 (12 lbs/ream), and an inside sandwich layer Low density polyethylene of about 9.75g[/m] ^{2} (6 lbs/ream), An anhydrous refining copolymer joining layer which uses ethylene of about 6.50 g/m^2 (4 lbs/ream) as a base, Amorphous nylon of about 9.75 g/m^2 (6 lbs/ream), An anhydrous refining copolymer joining layer which uses ethylene of about 6.50 g/m^2 (4 lbs/ream) as a base, About 9.75 g/m^2 (6 lbs/ream) low density polyethylene is comprised, A product contact layer comprises low density polyethylene of about 11.38 g/m^2 (7 lbs/ream), The paperboard container according to claim 1, wherein **** yield strength of said inside sandwich layer is about 281.2 kg/cm^2 (about 4,000 psi) slightly and point-of-rupture elongation is about 200% or less than it.
[Claim 18]An outside surface layer comprises low density polyethylene of about 19.50 g/m^2 (12 lbs/ream), and an inside sandwich layer Low density polyethylene of about 4.88g[/m] ^{2} (3 lbs/ream), An anhydrous refining copolymer joining layer which uses ethylene of about 6.50 g/m^2 (4 lbs/ream) as a base, Amorphous nylon of about 9.75 g/m^2 (6 lbs/ream), An anhydrous refining copolymer joining layer which uses ethylene of about 6.50 g/m^2 (4 lbs/ream) as a base, About 4.88 g/m^2 (3 lbs/ream) low density polyethylene is comprised, A product contact layer comprises low density polyethylene of about 11.38 g/m^2 (7 lbs/ream), The paperboard container according to claim 1, wherein **** yield strength of said inside sandwich layer is about 281.2 kg/cm^2 (about 4,000 psi) slightly and point-of-rupture elongation is about 200% or less than it.
[Claim 19]A stage which carries out simultaneous extrusion of the sandwich layer on the surface of another side of a paper board layer, comprising, (c) Excel in the gas cutoff characteristic comprising a stage which carries out extrusion of the olefin polymer layer which can be heat sealed on the surface of said sandwich layer so that an outside surface of said another side of a lamination may be formed, A manufacturing method of a paperboard lamination which can be heat sealed with which prevention from shift of oil refinement, a flavoring, and a vitamin has been improved.
(a) A stage where an olefin polymer layer which constitutes an outside surface of a lamination and which can be heat sealed chooses a charge of a support material which comprises a paperboard base material currently formed in one field of a paperboard.
(b) The first adhesive joint layer.

An amorphous nylon layer.
The second adhesive joint layer.

[Claim 20]The paperboard lamination manufacturing method according to claim 19 generating said charge of a support material through a stage which carries out flame treatment of the surface of said paperboard base material, and a stage which carries out extrusion covering by a low-density-polyethylene polymer layer which can heat seal said paperboard support surface top where flame treatment was performed.
[Claim 21]The paperboard lamination manufacturing method according to claim 19, wherein said low-density-polyethylene polymer layer which forms an outside surface of said paperboard comprises a layer whose coverage is about 9.75 - 13.00g[/m] ^{2} (about 6-18 lbs/ream) and which can be heat sealed.
[Claim 22]The paperboard lamination manufacturing method according to claim 19, wherein said sandwich layer comprises the first polyolefin layer, said first joining layer, said amorphous nylon layer, said second joining layer, and the second polyolefin layer one by one.
[Claim 23]Said sandwich layer Low density polyethylene of about 3.25 to 13.00 g/m^2 (about 2-8 lbs/ream), The paperboard lamination manufacturing method according to claim 22 comprising said first adhesive joint layer, said amorphous nylon layer, said second adhesive joint layer, and low density polyethylene of about 3.25 to 13.00 g/m^2 (about 2-8 lbs/ream).
[Claim 24]Said sandwich layer Low density polyethylene of about 3.25 to 13.00 g/m^2 (about 2-8 lbs/ream), Said first adhesive joint layer of about 3.25 to 9.75 g/m^2 (about 2-6 lbs/ream), Said amorphous nylon layer and said second adhesive joint layer of about 3.25 to 9.75 g/m^2 (about 2-6 lbs/ream), The paperboard lamination manufacturing method according to claim 23 comprising low density polyethylene of about 3.25 to 13.00 g/m^2 (about 2-8 lbs/ream).
[Claim 25]The paperboard lamination manufacturing method according to claim 24, wherein said first and the second joining layer use as an ingredient an anhydrous refining copolymer which uses ethylene as a base.
[Claim 26]Spreading formation of the low-density-polyethylene polymer layer which can heat seal about 9.75 to 29.26 g/m^2 (about 6-18 lbs/ream) is carried out in one field of said paperboard base material, Said inside sandwich layer Low density polyethylene of about 3.25 to 13.00 g/m^2 (about 2-8 lbs/ream), Said first adhesive joint layer of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), Amorphous nylon of about 6.50 to 19.50 g/m^2 (4-12 lbs/ream), It comprises said second adhesive joint layer of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), Low density polyethylene of about 3.25 to 13.00 g/m^2 (2-8 lbs/ream) is applied to a field of another side of said paperboard base material, The paperboard lamination manufacturing method according to claim 22, wherein said product contact layer comprises low density polyethylene of about 8.13 to 24.38 g/m^2 (5-15 lbs/ream).
[Claim 27]The first joining layer of an anhydrous refining copolymer to which said inside sandwich layer uses ethylene as a base, It comprises an amorphous nylon layer and the second joining layer of an anhydrous refining copolymer which uses ethylene as a base, The paperboard lamination manufacturing method according to claim 20, wherein said polyolefin layer comprises low density polyolefine of about 8.13 to 24.38 g/m^2 (5-15 lbs/ream).
[Claim 28]Said inside sandwich layer An anhydrous refining copolymer joining layer of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), The paperboard lamination manufacturing method according to claim 27 comprising an amorphous nylon layer and an anhydrous refining copolymer joining layer of about 3.25 - 9.75g[/m] ^{2} (2-6 lbs/ream).
[Claim 29]Spreading formation of the low-density-polyethylene polymer layer which can heat seal about 9.75 to 29.26 g/m^2 (about 6-18 lbs/ream) is carried out in one field of said paperboard, Said first joining layer of an anhydrous refining copolymer to which said inside sandwich layer uses ethylene of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream) as a base, Amorphous

nylon of about 6.50 to 19.50 g/m^2 (4-12 lbs/ream), The paperboard lamination manufacturing method according to claim 27 comprising said second joining layer of an anhydrous refining copolymer which uses ethylene of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream) as a base.
[Claim 30]The paperboard lamination manufacturing method according to claim 19, wherein **** yield strength of said inside sandwich layer is about 281.2 kg/cm^2 (about 4,000 psi) slightly.
[Claim 31]The paperboard lamination manufacturing method according to claim 19, wherein point-of-rupture elongation of said inside sandwich layer is about 200% or less than it.
[Claim 32]An olefin which is formed in said paperboard at one side and which can be heat sealed is low density polyethylene of about 19.50 g/m^2 (12 lbs/ream), Said inside sandwich layer Low density polyethylene of about 9.75 g/m^2 (6 lbs/ream), An anhydrous refining copolymer joining layer which uses ethylene of about 6.50 g/m^2 (4 lbs/ream) as a base, Amorphous nylon of about 9.75 g/m^2 (6 lbs/ream), An anhydrous refining copolymer joining layer which uses ethylene of about 6.50 g/m^2 (4 lbs/ream) as a base, It comprises low density polyethylene of about 9.75 g/m^2 (6 lbs/ream), An olefin polymer layer which is formed on said sandwich layer surface and which can be heat sealed is low density polyethylene of about 11.38 g/m^2 (7 lbs/ream), The paperboard lamination manufacturing method according to claim 22, wherein **** yield strength of said inside sandwich layer is about 281.2 kg/cm^2 (about 4,000 psi) only and point-of-rupture elongation is about 200% or less than it.
[Claim 33]An olefin which is formed in said paperboard at one side and which can be heat sealed is low density polyethylene of about 19.50 g/m^2 (12 lbs/ream), Said inside sandwich layer Low density polyethylene of about 4.88 g/m^2 (3 lbs/ream), An anhydrous refining copolymer joining layer which uses ethylene of about 6.50 g/m^2 (4 lbs/ream) as a base, Amorphous nylon of about 9.75 g/m^2 (6 lbs/ream), An anhydrous refining copolymer joining layer which uses ethylene of about 6.50 g/m^2 (4 lbs/ream) as a base, It comprises low density polyethylene of about 4.88 g/m^2 (3 lbs/ream), Olefin polymer which is formed on said sandwich layer surface and which can be heat sealed is low density polyethylene of about 11.38 g/m^2 (7 lbs/ream), The paperboard lamination manufacturing method according to claim 22, wherein **** yield strength of said inside sandwich layer is about 281.2 kg/cm^2 (about 4,000 psi) only and point-of-rupture elongation is about 200% or less than it.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This application is application based on the continuation-in-part application of U.S. patent application No.07/721,813.
The U.S. application concerned is quoted in the text.

[0002]This invention relates to a paperboard lamination.
It is a thing concerning a non foil paperboard lamination (non-foil paperboard laminate) available to manufacture of the container for products, such as fruit, citruses juice, and a drink thing, and a manufacturing method for the same in addition to the dried product which is not a fluid in particular, Said lamination is provided also with the oxygen operating characteristic which was excellent in addition to loss-prevention functions, such as oil refinement of the product currently packed up inside, a flavoring, and a vitamin.

[0003]
[Description of the Prior Art]A satisfying container has not come to be manufactured although the paperboard covered with low density polyethylene (LDPE) was conventionally used for manufacture of a drink thing container. Especially the paperboard covered with LDPE has comparatively high breathability to oxygen.
For this reason, oxidation might be performed and the aroma component and the vitamin might be spoiled.
Only oxidation is not the cause, even if an aroma component shifts into a LDPE layer or the loss of a scent is absorbed, it is produced, and the loss of such a scent is called "scalping" (scalping). For this reason, in order to obtain an ideal container, research of an additional cutoff material has been done.
[0004]It is possible to make it decrease substantially by using as a liner the lamination which has metal foil such an oxidation loss of vitamin C and inside a container. However, by using metal foil, expense became high and was not practical. As a result of studying the substitute of more economical foil, the laminate structure object which uses simultaneous extrusion polymer materials, such as polypropylene, a polyvinylidene chloride (PVdC), and an ethylene alcoholic vinyl copolymer (EVOH), was developed as interception material. For example, United States patent No.4,988,546 of Tanner, United States patent Nos.4,789,575 of Gibbonns et al., and 4,701,360, These interception material is indicated by United States patent No.4,513,036 of Thompson et al., United States patent No.5.059 of Huffman, and 459.
[0005]Since there is little expense and it not only ends, but it is using LDPE of a low for a contact layer with a product rather than the structure which has foil, even if the paperboard containing the above interception material is excellent also in respect of scent loss property, it is. Many of structural members for the paperboard cartons of the conventional marketing for juice or the same product are using the lamination containing an ethylene alcoholic vinyl copolymer as interception material to oxygen or flavor oil (flavor oil).
[0006]Or interception polymer for plastic bottles (Plastics World, 36 to February, 1986 pp.38

reference), A plastics packaging material (Aseptipak84, pp.119-148) and the nylon proposed as a substitute (Platics World July, 1984, pp.42-47) of cellophane are used. However, the characteristic of a plastic bottle or the interception material for a package completely differs in the characteristic demanded of the paperboard container, and even if it is interception material useful to a plastic bottle or a packing material, it may be unable to be used for a paperboard container. About the paperboard container, it is pasted together to the paperboard base material by United States patent Whillock et al.No.3,972,467 by the low density polyethylene layer, and the nylon film which has a low-density-polyethylene product contact layer is indicated. In this case, the **** yield strength of a nylon film is more than 218.2 kg/cm^2 (4,000 psi), and point-of-rupture elongation is not less than about 200%. Such a laminated film structure is expensive and a complicated laminating device is needed. When tensile strength is a material strong in this way, it is difficult to cut a container blank from a cutoff plate paper material, or to fabricate a container.

[0007]In United States patent No.4,777,088 of Thompson et al. The cutoff plate paper structure for oxygen maintenance within the object for flavor oil and a juice vessel (juice carton) is indicated, and in one side or both sides of said structure. The connective of a special ion copolymer material in which the molding material and the physical property are sold from duPont as the extrusion nylon layer which is unspecified, and the brand name Surlyn is applied. With the above-mentioned nylon cutoff plate paper laminate structure object, Surlyn is an essential ingredient as shown in said patent No.4,777,088.

[0008]In United States patent No.4,753,832 of Brown et al. It has a product contact filter layer which comprises glycol refining polyethylene terephthalic acid salt (glycol modified polyethylene terephthalate) (PET-G), Although the structural member which makes the interception material which can furthermore also have a nylon oxygen filter layer the charge of a support material is indicated, in the United States patent concerned, the kind of nylon is not specified and the characteristic [**** / said nylon material] is not limited, either. PET-G is an essential ingredient of said cutoff plate paper laminate structure object as indicated by said United States patent No.4,753,832.

[0009]In United States patent No.4,921,733 of Gibbonns et al., The nylon 6, Nylon 11, and Nylon 12 polymer whose tensile strength it is a crystalline material and is more than 703 kg/cm^2 (10,000 psi), It is indicated as an abuse-proof layer (abuse-resistent layers) which can be used combining oxygen interception material, such as caulking polymer, such as Surlyn ionomer resin, and aluminum foil for paperboard containers, etc.

[0010]

[Problem(s) to be Solved by the Invention]However, there is a problem that it is difficult for the conventional nylon films to be expensive, for a complicated laminating device to be needed, and for there to be a problem in respect of economical efficiency, and to cut the blank for containers from a cutoff plate paper material since tensile strength is strong, or to fabricate a container.

[0011]This invention is made in view of the technical problem of the above-mentioned conventional technology, and the purpose improves the laminate material in which heat sealing for containers of juice is possible, and does not make the scent / stinking ingredient of citruses or other juice penetrate, It is in providing the paperboard lamination which makes manufacture easy, without having had a substantial operating characteristic to the loss of vitamin C, equivalent to the polymer interception lamination used now, having the function beyond it, and spoiling economical efficiency further.

[0012]

[Means for Solving the Problem]To achieve the above objects, a paperboard lamination concerning this invention which has the interception nature to oxygen and a smell, A paperboard base material and an olefin polymer layer which is formed in one field of said paperboard base material, and constitutes an outer surface of a container and which can be heat sealed, An inside sandwich layer which comprises the first joining layer (a first tie layer), an amorphous nylon layer, and the second joining layer one by one, and is formed on a field of another side of said paperboard base material, It is formed on said paperboard base material of the same side as said

inside sandwich layer, and comprises an olefin polymer layer which constitutes a product contact surface inside said container and which can be heat sealed.
[0013]In a 1 suitable embodiment of this invention, preferably, Said olefin polymer layer which constitutes an outside surface of said container is constituted from low density polyethylene of about 9.75 to 29.26 g/m^2 (about 6-18 lbs/ream), Said inside sandwich layer Low density polyethylene of about 3.25 to 13.00 g/m^2 (2-8 lbs/ream), Said first joining layer of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), Amorphous nylon of about 6.50 to 19.50 g/m^2 (4-12 lbs/ream), and said second joining layer of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), It is preferred to constitute from low density polyethylene of about 3.25 to 13.00 g/m^2 (2-8 lbs/ream). Here, as for said first and the second joining layer, it is preferred to constitute ethylene from an anhydride refining copolymer (anhydride modified ethylene-based copolymer) used as a base. As for said inside product contact surface polymer layer, it is desirable to constitute from low density polyethylene of about 8.13 to 24.38 g/m^2 (about 5-15 lbs/ream). As for **** yield strength of said inside sandwich layer, at this time, it is preferred about 281.2 kg/cm^2 (about 4,000 psi) and that point-of-rupture elongation becomes about 200% or less than it further.
[0014]A paperboard lamination manufacturing method of this invention about manufacture of the above-mentioned paperboard lamination which is excellent in the gas cutoff characteristic and prevents shift of oil refinement, a flavoring, and a vitamin and which can be heat sealed, A stage where an olefin polymer layer which constitutes an outside surface of a lamination and which can be heat sealed chooses a charge of a support material which comprises a paperboard base material currently formed in one field of a paperboard, A stage which carries out simultaneous extrusion of the sandwich layer which comprises the first adhesive joint layer, an amorphous nylon layer, and the second adhesive joint layer on the surface of another side of a paper board layer, It comprises a stage which carries out extrusion of the olefin polymer layer which can be heat sealed on the surface of said sandwich layer so that an outside surface of said another side of a lamination may be formed.
[0015]As for said charge of a support material, in a 1 suitable embodiment of this invention, it is desirable to extrude and generate a low-density-polyethylene polymer layer which can be heat sealed on said paperboard support surface which carried out flame treatment of the surface of said paperboard base material, and where flame treatment was performed. As for coverage of said low-density-polyethylene polymer layer which forms an outside surface of said paperboard, it is preferred to consider it as about 9.75 to 13.00 g/m^2 (about 6-18 lbs/ream). Said sandwich layer Low density polyethylene of about 3.25 to 13.00 g/m^2 (about 2-8 lbs/ream), Said first adhesive joint layer, said amorphous nylon layer, and said second adhesive joint layer, It constitutes from low density polyethylene of about 3.25 to 13.00 g/m^2 (about 2-8 lbs/ream), and, as for said first and the second joining layer, it is desirable to use as an ingredient an anhydrous refining copolymer which uses ethylene as a base.
[0016]
[Function and Effect]It is not only the dried product that is not a fluid but fruit, citruses juice, and an object for drink things, and can heat seal, Manufacture is easy and the advanced non foil lamination concerning this invention which has reliability in the performance in the spot comprises lamination polymer sandwiches which applied the amorphous nylon polymer filter layer to the internal surface of a paperboard base material.
[0017]Amorphous nylon is a polymer material with comparatively low intensity, and although it differs from high intensity crystallinity nylon material, such as nylon 6 material currently used for the cutoff plate paper lamination from the former, in respect of a physical property, it is equivalent in the oxygen operating characteristic. Even if it added neither high intensity polymer nor an oxygen filter layer to the surprising thing, it became clear that it was possible to use amorphous nylon with intensity low in this way as interception material of a paperboard base material.
[0018]Thus, in the one example of this invention, the polyolefine outer layer which can be heat

sealed as a charge of a support material, and the paperboard preferably covered with low density polyethylene are used. Simultaneous extrusion of the five-layer sandwich structure which changes from polyolefine / joining layer / amorphous nylon / joining layer / polyolefine to the internal surface of said paperboard is carried out, and the laminate layer is formed. The laminate layer concerned is constituted from the outside of the container by polyolefine / paperboard / polyolefine / joining layer / amorphous nylon / joining layer / polyolefine in order inside.
[0019]As for the polyolefine currently used for the sandwich layer, it is desirable that it is low density polyethylene. In order to increase thickness so that the flexural rigidity of a product may increase if required, it is also possible to carry out extrusion of the polyolefine product contact layer which comprises low density polyethylene preferably and which can be heat sealed further on the inner surface of said sandwich layer by which simultaneous extrusion was carried out. Before applying to the field of the opposite hand of a paperboard said sandwich layer by which simultaneous extrusion was carried out, the whole paperboard can be manufactured with the line of an one pass by covering with polyolefine another field of the paperboard by which flame treatment was carried out.
[0020]As a final structure, the polyolefine which can be heat sealed on an inner surface and an outside surface, and the cutoff plate paper lamination which has polyethylene preferably are obtained, and while it has the most desirable heat-sealing characteristic, an operating characteristic equivalent to the former is secured. Compared with the conventional structural member, processing to a container blank (container blanks) or a container becomes easy.
[0021]the operative condition of others of this invention -- set like and the laminate structure member for paperboard carton or containers comprises a paperboard -- the outside surface of the paperboard concerned -- polyolefine -- it is preferably covered with LDPE and the outside surface of carton can be heat sealed. Therefore, in a single manufacturing step, on the joining layer which had exposed further the three-layer interception sandwich structure body of a joining layer / amorphous nylon / joining layer to the inner surface of a paperboard outside simultaneous extrusion and after this, a polyolefin layer is extruded and a product contact layer is formed. Here, as for the polyolefine currently used as a product contact layer, it is desirable that it is low density polyethylene.
[0022]If the lamination of this invention is used, an assembly of carton becomes easy and the assembled carton has the gas cutoff characteristic outstanding to a fluid, a dried product, and seasoning oil (flavor oil).

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In the case of the carton blank produced by the lamination of this invention. Compared with the case of the carton blank which comprises the lamination which has an ethylene alcoholic vinyl filter layer, the availability (runnability) of the weave bending device for carton blanks improves, and there is an advantage that a manufacturing process can be simplified.
[0023]
[Example]Hereafter, the suitable example of the paperboard container concerning this invention is described, using a drawing.
[0024]Production of the paperboard concerning the first example of this invention is explained below, referring to drawing 1 and 2.
[0025]the start -- one field of the paperboard base material 1 -- a flame -- or corona treatment is carried out. Next, the low-density-polyethylene (LDPE is called hereafter) layer 2 is extruded and covered with the temperature of about 315.56 ** (about 600 degrees F) on the treated surface of said paperboard 1. The temperature of 282.22 ** - 326.67 ** (540 degrees F - 620 degrees F) is desirable, the adhesive strength to a paperboard becomes good, and the outside surface of a lamination is constituted. If required, the coating layer of LDPE may not be formed on the paperboard base material with which covering is not given in the first step of the manufacturing process, but the paperboard base material beforehand covered with LDPE may be used.
[0026]Simultaneous extrusion covering of said internal surface is directly carried out by the sandwich layer 3 of five layers which contains a flame or the amorphous nylon 31 which carried out corona treatment and was pinched in the LDPE coating layers 33 and 33 of the vinyl-bonds

layers 32 and 32 of a bilayer, and a bilayer for another internal surface of said paperboard base material. The temperature of the extrusion covering concerned must be controlled so that degradation of the amorphous nylon 31 and the joining layers 32 and 32 does not take place, and so that a polymer extrusion coating characteristic is kept good. The supply temperature to the extrusion machine of each substance of a sandwich structure body in three examples of an experiment about generation of this lamination is shown below.
[0027]
1 2 3 amorphous nylon 304.44 ** (580 degrees F). 322.78 ** (613 degrees F) 325.56 ** (618 degrees F) vinyl 304.44 ** (580 degrees F) 327.22 ** (621 degrees F) 327.22 **(621 degrees F) LDPE 326.67 ** (620 degrees F) 305.56 ** (582 degrees F). The product contact layer 4 which changes from low density polyethylene to the 302.22 ** (576 degrees F) last is extruded on the internal surface of said five-layer sandwiches 3. As for the full weight of the polymer extruded on said paperboard inner surface, it is desirable that it is below about 89.40 g/m^2 (55 lbs/ream). (The size of Ream is 278.7-m^2 (3,000 sq.feet) here.) Crease processing of said lamination and cutting to a blank are easy. then -- bending these blanks by the conventional method -- a side seam -- and heat-sealing processing is carried out. In this way, the produced blank can perform restoration with a device, and a sealing process conventionally by the usual method always.
[0028]According to the second example of this invention, so that either of the joining layers 52 may contact said paperboard base material 1, as shown in drawing 3 a, Simultaneous extrusion of the three-layer sandwich structure body 5 which allotted the amorphous nylon layer 51 in the center, and was pinched [both ends] in the vinyl joining layers 52 and 52 of the bilayer is carried out to the surface of said paperboard base material 1. Next, the surface of said joining layer 52' is covered with the polyolefin layer 4, and a product contact surface is formed.
[0029]In the example of others of drawing 3 b, simultaneous extrusion of said sandwich layer is directly carried out to the surface of the charge of a support material which the coating layer of LDPE was formed in both sides of a paperboard, and was fabricated beforehand. When the sandwiches by which simultaneous extrusion was carried out are three layers as shown in drawing 3 a, an above-mentioned structure and omitting become same [the structure acquired eventually], but the polyolefin layer is further already further inserted between said paperboard and the simultaneous extrusion layer.
[0030]In the case of such coating treatment, it is preferred that a symmetrical layer system is generally structure with a symmetrical simultaneous extrusion sandwich layer most for a simultaneous extrusion and cone reason. However, if required, it is also possible to perform asymmetric simultaneous extrusion processing (asymmetric coextrusion), and to make a part of simultaneous extrusion sandwich structure into said product contact layer.
[0031]Although olefin polymer suitable for this invention can be heat sealed and it comprises polypropylene, high density polyethylene, medium density polyethylene, low density polyethylene, low line density (linear low density) polyethylene, and such combination, Especially low density polyethylene is preferred. The polyolefine of a commercial extrusion paint level can be used by this invention. The additive agent is contained in olefin polymer and desired mobility, adhesiveness, or the heat-sealing characteristic is obtained.
[0032]The paperboard used by this invention is made qualitatively [, such as a milk churn, / suitable / of original] (paperboard stock) for high-definition paperboards, for example. The basic weight of said paperboard is about 243.81 to 487.62 g/m^2 (about 150-300 lbs/ream), and is about 422.60 g/m^2 (260 lbs/ream) preferably. A flame or corona treatment, and/or under coat processing are performed to one of the field or both sides of the paperboard so that adhesion with the following polymer layer may become easy. As an under coat agent to be used, there are some which comprise polyethylene amine (PEI) or ethylene vinyl acetate.
[0033]The amorphous nylon currently used by this invention is suitable for carrying out simultaneous extrusion to a paperboard support surface. In order to simplify a manufacturing process, the point-of-rupture elongation of the sandwich layer which comprises the polymer by which simultaneous extrusion was carried out, and said amorphous nylon is about 200% or less,

and **** yield strength is below about 281.2 kg/cm^2 (about 4,000 psi). The **** yield strength of amorphous nylon itself is 703 kg/cm^2 (10,000 psi), and it is most preferred that point-of-rupture elongation is 200% or less. As desirable amorphous nylon, there is Selar PA3426 currently sold from the United States DuPont Corporation. In the case of the nylon which has crystallinity substantially, in the breakdown point, it has the tensile strength more than 703 kg/cm^2 (10,000 psi), and the elongation in the point of rupture is not less than 200%, and nylon 6, nylon 6-6, etc. cannot acquire the effect of this invention for this raw material.

[0034]Joining layer resin concerning this invention suitable for simultaneous extrusion with amorphous nylon is made of resin excellent in the adhesive property with amorphous nylon and polyolefine. As for the joining layer resin which has the suitable adhesion characteristic, what uses an anhydride refining copolymer, especially an anhydride refining ethylene copolymer as an ingredient is preferred. It is most preferred that they are anhydride refining low line density / low density ethylene copolymer (anhydride modified linear low/low density ethylene copolymers). As the anhydride refining low line density / a low density ethylene copolymer which is suitable as a joining layer substance in this invention, there is the vinyl E388 currently sold from the United States duPont Corporation. As other duPont products, anhydrous refining ethylene acrylate copolymers (vinyl E369) can also be used as a joining layer. The material which was suitable as a joining layer material is indicated by United States patent Nos.4,087,587 and 4,087,588, and both patents are quoted as reference literature in this application specification. The material currently indicated by these patents is sold by the brand name Plexar.

[0035]The interception lamination generated by this invention is excellent in the operating characteristic, and conforms to the conditions which American Food and Drug Administration (FDA) about a foodstuffs contact package (food contact packaging) demands. For example, the lamination of this invention which comprises five-layer sandwich structure, It comprises external covering which comprises LDPE of about 9.75 to 29.26 g/m^2 (6-18 lbs/ream), a paperboard in which thickness is decided by size of carton, and a sandwich layer by which simultaneous extrusion is carried out on the internal surface of the paperboard concerned.

Further the sandwich layer concerned LDPE of about 3.25 to 13.00 g/m^2 (about 2-8 lbs/ream), The adhesive joint layer (vinyl E388) of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), Amorphous nylon (Selar PA 3426) of about 6.50 - 19.50g[/m] ^{2} (4-12 lbs/ream), The joining layer (vinyl E388) of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream), It comprises a product contact layer which comprises LDPE of about 3.25 to 13.00 g/m^2 (2-8 lbs/ream), and LDPE of about 8.13 to 24.38 g/m^2 (5-15 lbs/ream).

The lamination of this invention The LDPE external coating layer of about 19.50 g/m^2 (12 lbs/ream), The paperboard of about 422.60 g/m^2 (260 lbs/ream), LDPE of about 4.88 g/m^2 (3 lbs/ream), The vinyl E388 of about 6.50 g/m^2 (4 lbs/ream), Selar PA of about 9.75 g/m^2 (6 lbs/ream), The vinyl E388 of about 6.50 g/m^2 (4 lbs/ream), LDPE of about 4.88 g/m^2 (3 lbs/ream), It is preferred to comprise a LDPE product contact layer of about 11.38 g/m^2 (7 lbs/ream), and said lamination, The LDPE external coating layer of about 19.50 g/m^2 (12 lbs/ream), The paperboard of about 422.60 g/m^2 (260 lbs/ream), LDPE of about 9.75 g/m^2 (6 lbs/ream), the vinyl E388 of about 6.50 g/m^2 (4 lbs/ream), and Selar PA of about 9.75 g/m^2 (6 lbs/ream), It is most preferred to comprise a product contact layer which comprises the vinyl E388 of about 6.50 g/m^2 (4 lbs/ream), LDPE of about 9.75 g/m^2 (6 lbs/ream), and LDPE of about 11.38 g/m^2 (7 lbs/ream). Here, the size of Ream is 278.7-m^2 (3,000 ft^2).

[0036]The lamination of this invention which has four-layer sandwiches, Thickness comprises a LDPE coating layer of about 9.75 to 29.26 g/m^2 (about six to 18 lbs/ream) currently formed in the surface of the paperboard decided by size of carton, and a simultaneous extrusion sandwich layer applied on the internal surface of said paperboard.

The anhydrous refining copolymer joining layer to which the sandwich layer concerned uses the

ethylene of about 3.25 to 9.75 g/m^2 (about 2-6 lbs/ream) as a base, Amorphous nylon of about 6.50 to 19.50 g/m^2 (4-12 lbs/ream), It comprises an anhydrous refining copolymer joining layer which uses the ethylene of about 3.25 to 9.75 g/m^2 (2-6 lbs/ream) as a base, and a LDPE layer of about 8.13 to 24.38 g/m^2 (5-15 lbs/ream).

[0037]It was checked by the surprising thing that the lamination of this invention has an operating characteristic equivalent to the lamination which comprises an ethylene alcoholic vinyl copolymer. The juice vessel of the refrigerated type of packing is in usually humid environment, and since the oxygen permeability of amorphous nylon is high compared with an ethylene alcoholic vinyl copolymer even if it is in such a state, the above characteristics are not usually predicted, as shown in drawing 4.
[0038]The lamination which relates to this invention with the extrusion line which carried out continuous line arrangement of the extrusion machine of the three examples of the first experiment is generated. LDPE of about 19.50 g/m^2 (12 lbs/ream) is first applied most to the left lateral of the paperboard base material with which flame treatment was performed using the extrusion machine of eyes. Next, flame treatment of another field of said base material is carried out, and an under coat is carried out by PEI. In the second extrusion position, from three sets of extrusion machines, LDPE, Selar PA amorphous nylon, and the vinyl E388 are poured into one extrusion type, and the simultaneous extrusion sandwich layer of five layers which comprises LDPE / vinyl E388-/Selar PA / vinyl E388-/LDPE is formed. Finally, extrusion of about 3.17 kg (7lbs) LDPE layer is carried out to the surface of said sandwich layer by which simultaneous extrusion was carried out in the position of the third extrusion machine. There was no trouble of production of the container blank by a cutoff plate paper structural member and a container.
[0039]The comparative study about the example vitamin C of the second experiment, restoration vacuity, and the decomposition oxygen characteristic was carried out using the container which comprises a laminate structure member. Said laminate structure member comprises an amorphous nylon filter layer, and an ethylene alcoholic conventional vinyl copolymer, PET and LDPE filter layer structural member. The lamination concerned is produced so that it may become the structure shown in Table 1.
[0040]
[Table 1]

表　1

動作比較用対象構造部材
構造１ 制御（標準ＥＶＯＨ構造） １２＃ＬＤＰＥ／板紙／８＃ＬＤＰＥ／火炎処理面(flame) ／ ６＃ＥＶＯＨ／４＃Ｐｌｅｘａｒ　１７７／１０＃ＬＤＰＥ
構造２ 標準ＥＶＯＨ構造中にビニル接合層を含む １２＃ＬＤＰＥ／板紙／８＃ＬＤＰＥ／火炎処理面／ ４＃ＥＶＯＨ／４＃ビニルＥ３８８／１０＃ＬＤＰＥ
構造３ ＥＶＯＨの塗布量が少ないビニル接合層 １２＃ＬＤＰＥ／板紙／８＃ＬＤＰＥ／火炎処理面／ ４＃ＥＶＯＨ／４＃ビニルＥ３８８／１０＃ＬＤＰＥ
構造４ ＥＶＯＨの塗布量が多いビニル接合層 １２＃ＬＤＰＥ／板紙／８＃ＬＤＰＥ／火炎処理面／ ９＃ＥＶＯＨ／４＃ビニルＥ３８８／１０＃ＬＤＰＥ
構造５ ビニル接合層を有する非晶質ナイロン １２＃ＬＤＰＥ／板紙／３＃ＬＤＰＥ／４＃ビニルＥ３８８／ ６＃　Ｓｅｌａｒ　ＰＡ／４＃　ビニルＥ３８８／ ３＃ＬＤＰＥ／７＃ＬＤＰＥ
構造６ ポリエステル １２＃ＬＤＰＥ／板紙／３＃ＬＤＰＥ／４＃ビニルＥ３６９／ ７．５＃　ＰＥＴ／４＃　ビニルＥ３６９／３＃ＬＤＰＥ／ ７＃ＬＤＰＥ
構造７ ＬＤＰＥ牛乳容器 １２＃ＬＤＰＥ／板紙／２０＃ＬＤＰＥ

[0041]Plexar 177 is a joining layer material currently sold from Quantum Chemical Corporotion. PET is the abbreviation for polyethylene terephthalic acid salt. The result of each vitamin C about said four laminate structure objects, restoration vacuity, and decomposition oxygen is shown in drawing 5, and 6 and 7. The oxygen permeability of the laminate structure member produced by this invention is compared with the oxygen permeability of an EVOH lamination and a PET lamination shown in Table 2.

[0042]

[Table 2]

表　2

表１に示されている遮断構造用の目標厚み（５℃、相対湿度１００％）に基づく目標及び測定遮断ポリマーの厚みおよび測定酸素透過性				
構造	ポリマー	目標厚み (mils)	測定厚み (mils)	酸素透過特性 (cc•mil/100•in^2 • day•ATM)
1	EVOH	0.33	0.3-0.4	—
2	EVOH	0.33	0.3-0.4	0.09
3	EVOH	0.22	0.2-0.8	0.08
4	EVOH	0.5	0.5-0.6	0.09
5	Selar PA	0.33	0.3-0.4	0.24
6	PET	0.4	0.4	0.57

[0043]In order to investigate the retention capacity of vitamin C, the oxygen level in restoration vacuity, and a decomposition oxygen level, the juice of refrigeration was poured into the paperboard container produced by said lamination, and it saved at the temperature of 5 ** for a maximum of eight weeks. Carton was taken out for every week for analysis. Measurement of vitamin C was performed according to AOAC (Association of Official Agricultural Chemists, Chicago). Juice was extracted three aliquots and it titrated to each aliquot. Restoration vacuity was measured using the Macon HS-750 head-space analyzer. 10 ml of gas in restoration vacuity is made to discharge via an airtight bulkhead, and it pours into said analyzer. The analyzer concerned is proofread with the standard gas mixture thing containing 0.5% of oxygen, and indoor air. Decomposition oxygen was measured using the model 58 decomposition O'2 meter equipped with a model 5739 decomposition oxygen probe by Yellow Springs Instruments and the product made from Inc. Said juice vessel is agitated and 125 ml is poured in into a 250-ml beaker. Juice was agitated using said probe until the reading was set to the fixed level. This probe is laid in an airtight container together with saturated sponge, and is proofread with the air of 100% of relative humidity.

[0044]An experimental result is shown in Tables 3 and 4.

[0045]

[Table 3]

表　3

8週間の結果、貯蔵寿命の調査			
構造１	（６＃　EVOH　遮断；Plexar結合層）		
週	ビタミンC（m/100cc）	充填空隙酸素濃度(%)	分解酸素(ppm)
1	35.1	17.1	6.4
2	30.9	14.2	7.0
3	32.0	12.3	5.2
4	30.5	12.1	4.5
5	28.4	11.3	7.9
6	27.4	14.7	3.5
7	24.3	19.5	4.2
8	24.8	19.4	3.8
構造２	（６＃　EVOH　遮断；ビニル結合層）		
1	34.3	13.7	6.0
2	31.5	12.1	8.8
3	34.2	11.6	3.6
4	30.7	10.1	3.9
5	27.0	14.7	3.9
6	27.7	7.8	3.3
7	27.5	7.2	3.8
8	27.8	7.7	3.2
構造３	（４＃　EVOH　遮断；ビニル結合層）		
1	34.1	15.4	6.4
2	28.6	14.7	4.3
3	31.5	15.2	8.4
4	29.5	11.5	6.4
5	25.3	19.8	6.9
6	25.4	18.9	4.4
7	25.3	14.1	3.1
8	25.8	10.8	3.8

[0046]
[Table 4]

表　3　続き

8週間の結果、貯蔵寿命の調査			
構造4　（9＃　EVOH　遮断；ビニル結合層）			
週	ビタミンC（m/100cc）	充填空隙酸素濃度(%)	分解酸素(ppm)
1	33.3	14.9	8.8
2	29.9	14.8	4.1
3	32.4	19.5	5.8
4	31.0	12.0	4.6
5	26.2	17.0	4.3
6	28.7	9.5	3.5
7	27.2	8.2	3.7
8	27.5	8.3	3.0
構造5　（6＃　非晶質ナイロン；ビニル結合層）			
1	34.6	16.6	8.7
2	31.7	13.2	8.7
3	33.0	16.4	6.2
4	31.0	10.7	4.6
5	26.0	19.3	6.6
6	27.2	15.1	3.3
7	21.0	19.8	4.9
8	25.5	8.1	3.4
構造6　（7.5＃　PET　遮断；ビニル結合層）			
1	34.1	15.6	6.5
2	30.2	15.2	5.6
3	28.7	15.3	6.5
4	24.9	15.0	8.8
5	20.7	20.1	9.1
6	17.0	18.8	5.4
7	13.7	15.3	4.7
8	12.3	16.5	4.9

[0047]
[Table 5]

表　3　続き

8週間の結果、貯蔵寿命の調査			
構造7　（LDPE　牛乳容器）			
週	ビタミンC（m/100cc）	充填空隙酸素濃度(%)	分解酸素(ppm)
1	30.2	17.1	7.9
2	27.8	20.4	9.8
3	24.5	20.1	9.8
4	19.4	18.3	9.1
5	12.5	19.9	8.8
6	10.4	19.6	6.5
7	4.3	18.8	6.3
8	0.8	19.3	7.7

[0048]
[Table 6]

表　4

	8週間冷蔵保存後のビタミンC保持率
構　造	ビタミンC保持率(%)
1	71
2	79
3	74
4	78
5	73
6	35
7	2

[0049]From the experimental result of Table 4, in spite of the hyperoxia penetration characteristic shown in the data (drawing 4) of point **, and a measurement result (Table 2), The vitamin-C holding property of the carton (structure 5) which comprises the amorphous nylon interception laminate structure of this invention is completely equal to the holding property of the carton which changes from an EVOH interception laminate structure object (structure 2-4) to a surprising thing.
[0050]Thus, it turns out that the operating characteristic of a cutoff plate paper lamination of this invention is equal to the most desirable product that can be used now, i.e., the product containing an ethylene alcoholic vinyl copolymer. In the cutoff plate paper lamination of this invention, compared with the cutoff plate paper lamination which uses a high intensity polymer material, processing with the conventional cutting, weave bending, and the device for heat sealing is easy, and durable carton can be manufactured.
[0051]The tensile strength of the sandwich structure body by which simultaneous extrusion covering of the example amorphous nylon of the third experiment, nylon 6, a nylon 6 film material with a PVDC coating layer, and drawing 1 was carried out, and the comparative study of the extension characteristic were carried out in accordance with the ASTM method D882. The result is shown in Table 5.
[0052]
[Table 7]

表　5

	特　性		
フイルム	方　向	破断点の伸び(%)	引張強度(Psi)
Selar PA 1 mil 3426	機　械	14.8	約61.077kg/cm ^{2} (8,688psi)
	横　断	6.3	約450.62kg/cm ^{2} (6,410psi)
Selar PA 3 mils 3426	機　械	96.0	約673.47kg/cm ^{2} (9,580psi)
	横　断	4.1	約587.00kg/cm ^{2} (8,350psi)
LDPE/ ビニル / Selar PA/ ビニル /LDPE	機　械	118.0	約218.98kg/cm ^{2} (3,115psi)
	横　断	70.2	約208.09kg/cm ^{2} (2,960psi)
ビニル /Selar PA/ ビニル	機　械	70.5	約198.60kg/cm ^{2} (2,825psi)
	横　断	15.4	約172.24kg/cm ^{2} (2,450psi)
**Capran° 1 mil 77C	機　械	375-500	約703-1124.8cm^2 (10,000-16,000psi)
	横　断	375-500	約703-1124.8cm^2 (10,000-16,000psi)
**Capran° 77K	—	250-600	

*　Capran 77 はナイロン6、Capran 77KはPVDC被覆されたナイロン6でニュージャージー州 Morristown,Allied Corporation より発売

**　Capran 77K,77Cに関するAllied Corporationの文献報告に基づく

[0053]As shown in Table 5, compared with nylon 6 or nylon 6 with a PVDC coating layer, the elongation of amorphous nylon in the point of rupture is low, and in addition to a thing with low elongation in the point of rupture, the tensile strength of the sandwich structure body by which simultaneous extrusion covering of this invention was carried out is also low, and, for this reason, it can acquire a desired fabrication property.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The sectional view showing the structure of the cutoff plate paper lamination concerning this invention
[Drawing 2]The block diagram showing the general manufacturing process of said cutoff plate paper lamination concerning this invention
[Drawing 3]3b is a sectional view showing the cutoff plate paper lamination which 3a requires for the example of others of this invention, and a sectional view showing the cutoff plate paper lamination concerning the example of others of this invention.
[Drawing 4]The graph which shows change of the humidity of amorphous nylon and an ethylene alcoholic vinyl copolymer, and oxygen permeability
[Drawing 5]The graph which shows the retention capacity of the vitamin C obtained in the example of the second experiment
[Drawing 6]The graph which shows the amount of oxygen within the restoration vacuity (headspace) of the carton examined in the example of the second experiment
[Drawing 7]The graph which shows the amount of decomposition oxygen in the juice included by the carton examined in the example of the second experiment
[Description of Notations]
1 Paperboard base material
2 LDPE layer
3 Sandwich layer
4 Product contact layer
5 Three-layer sandwich layer
31 Amorphous nylon
32 and 32' vinyl joining layer
33 and 33'LDPE coating layer
51 Amorphous nylon
52 and 52' vinyl joining layer

[Translation done.]

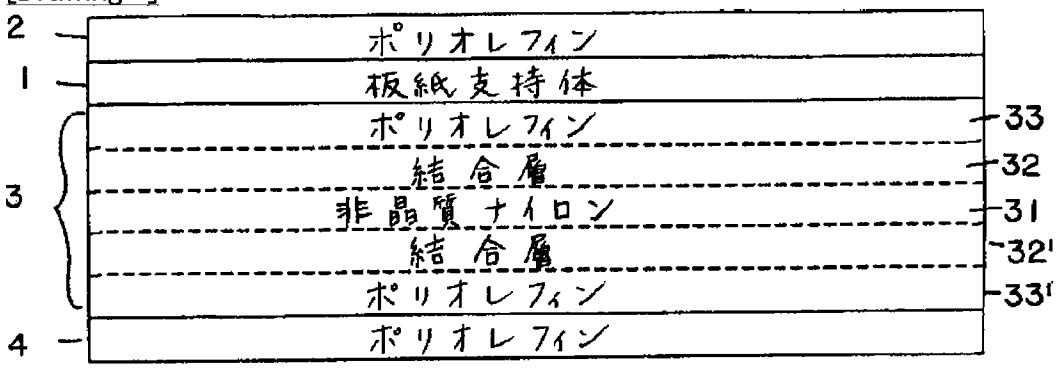
* NOTICES *

JPO and INPIT are not responsible for any
damages caused by the use of this translation.

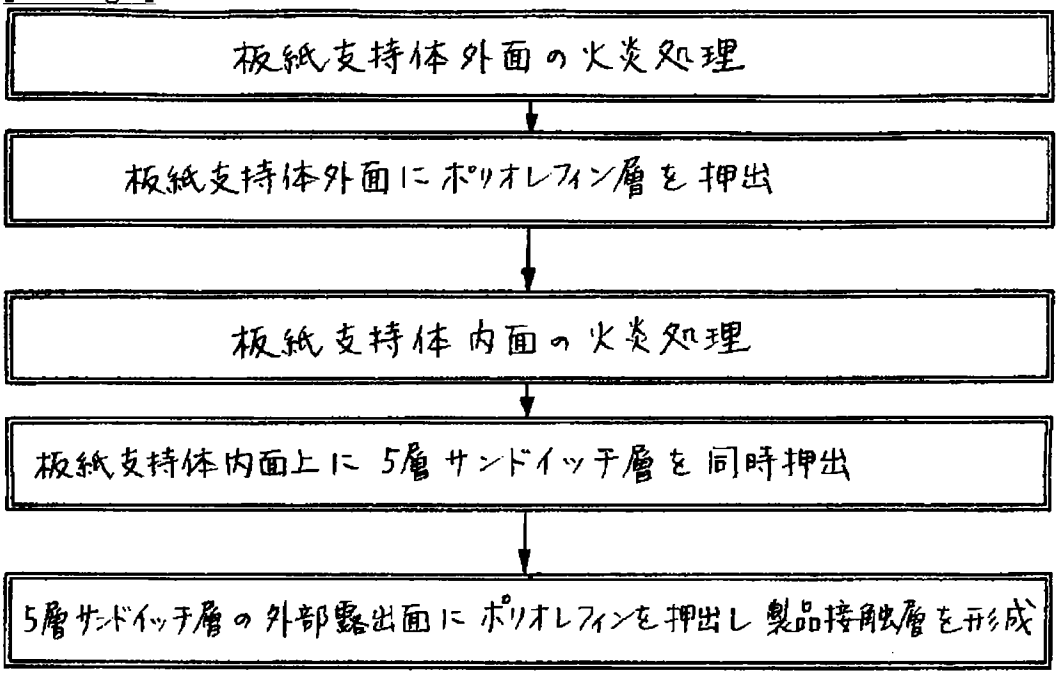
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

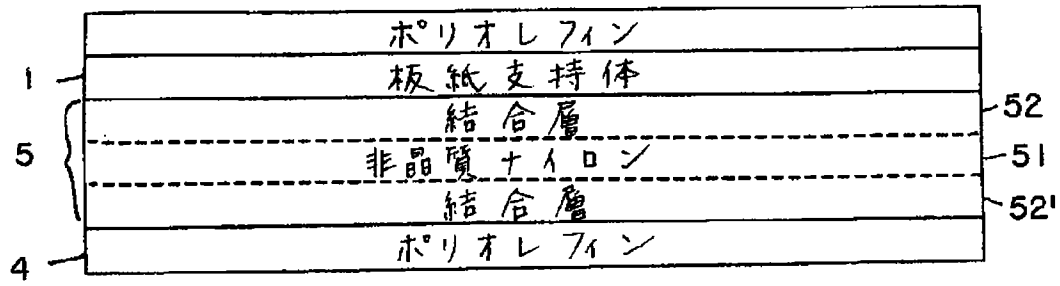


[Drawing 2]

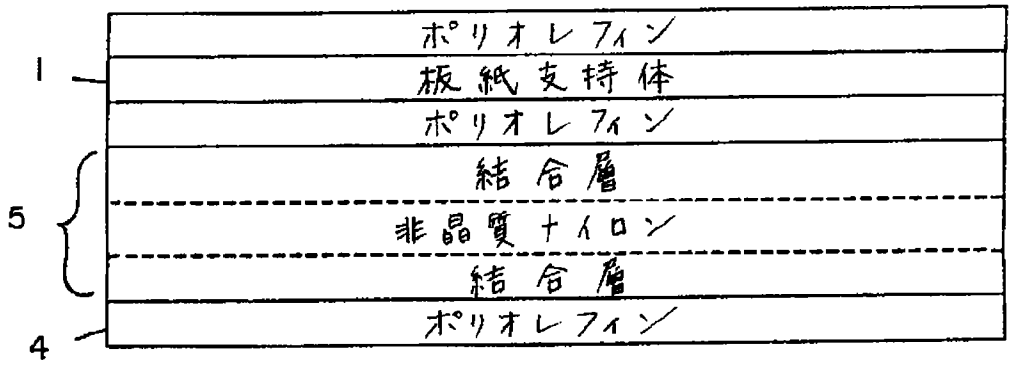


[Drawing 3]

a


ポリオレフィン
板紙支持体
結合層
非晶質ナイロン
結合層
ポリオレフィン
1
5
4
52
51
52'

b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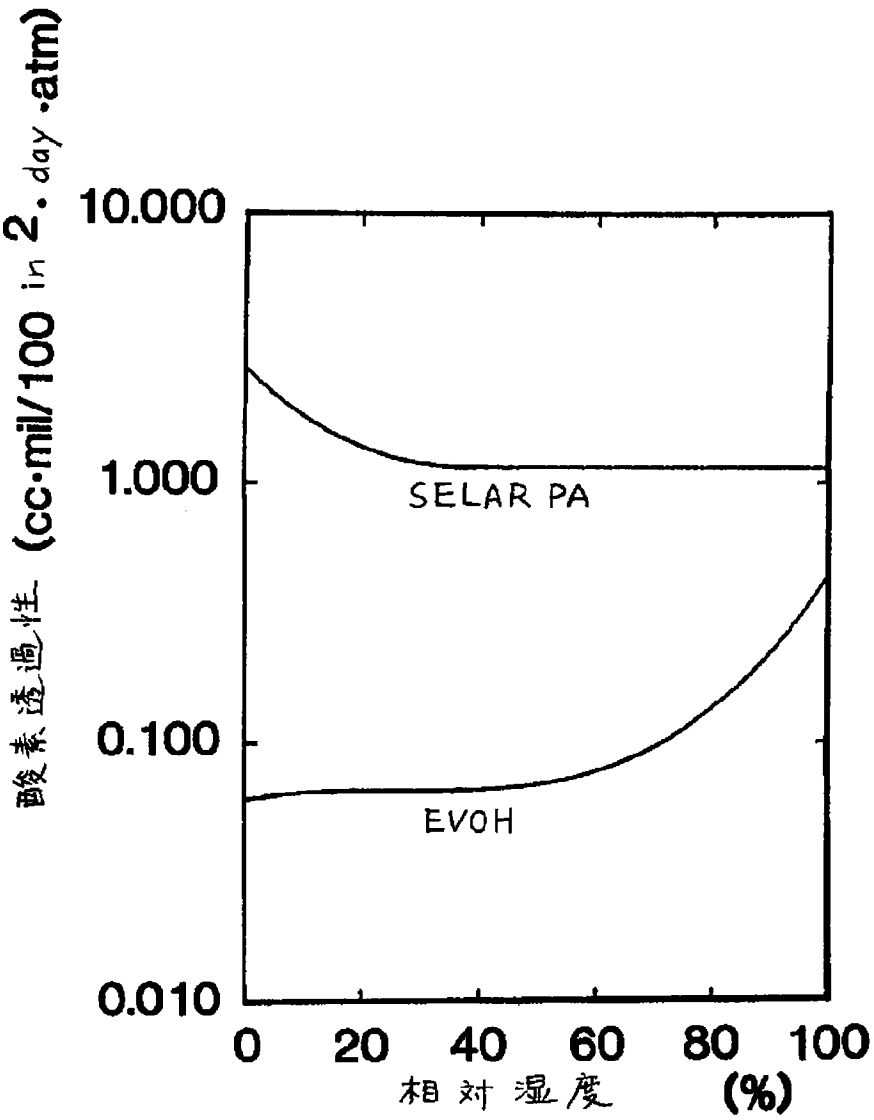
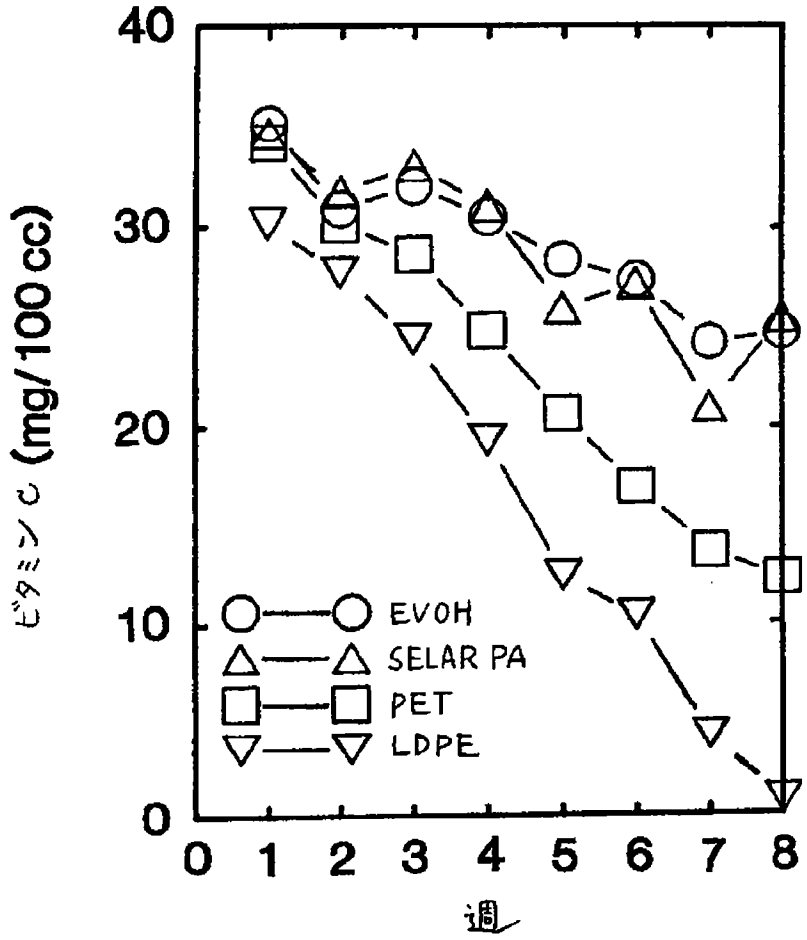
板紙支持体
ポリオレフィン
結合層
非晶質ナイロン
結合層
ポリオレフィン
1
5
4

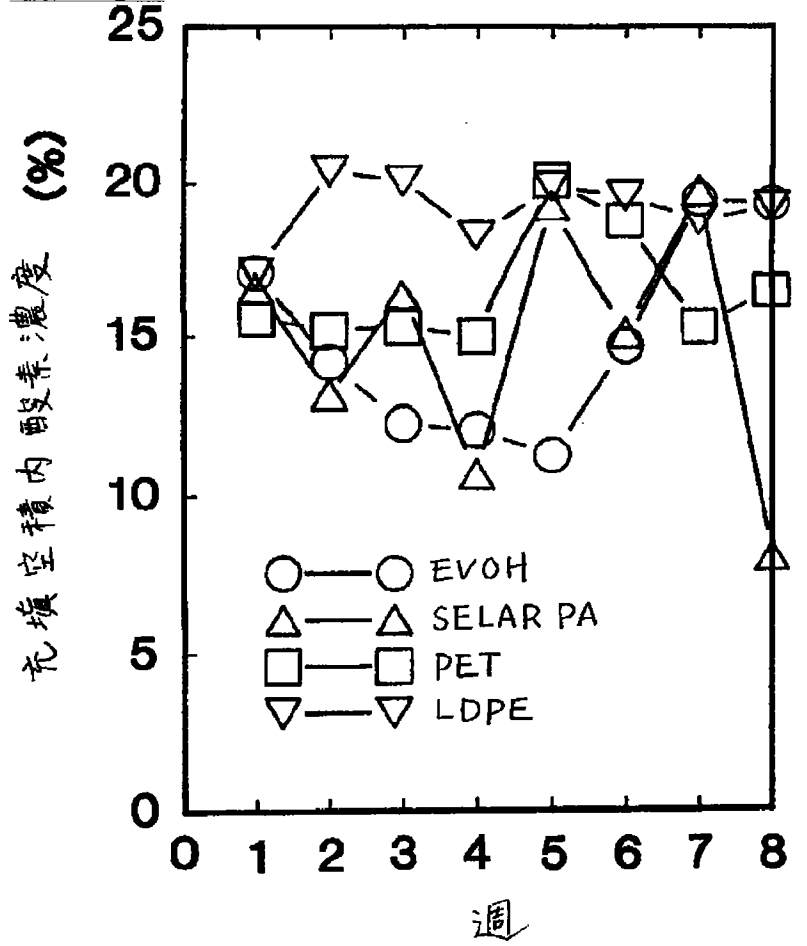
[Drawing 4]


酸素透過性 (cc·mil/100 in 2· day ·atm)
10.000
1.000
0.100
0.010
SELAR PA
EVOH
0
20
40
60
80
100
相対湿度
(%)

[Drawing 5]


ビタミンC (mg/100 cc)
40
30
20
10
0
0 1 2 3 4 5 6 7 8
週
EVOH
SELAR PA
PET
LDPE

[Drawing 6]


充填空積内酸素濃度 (%)
25
20
15
10
5
0
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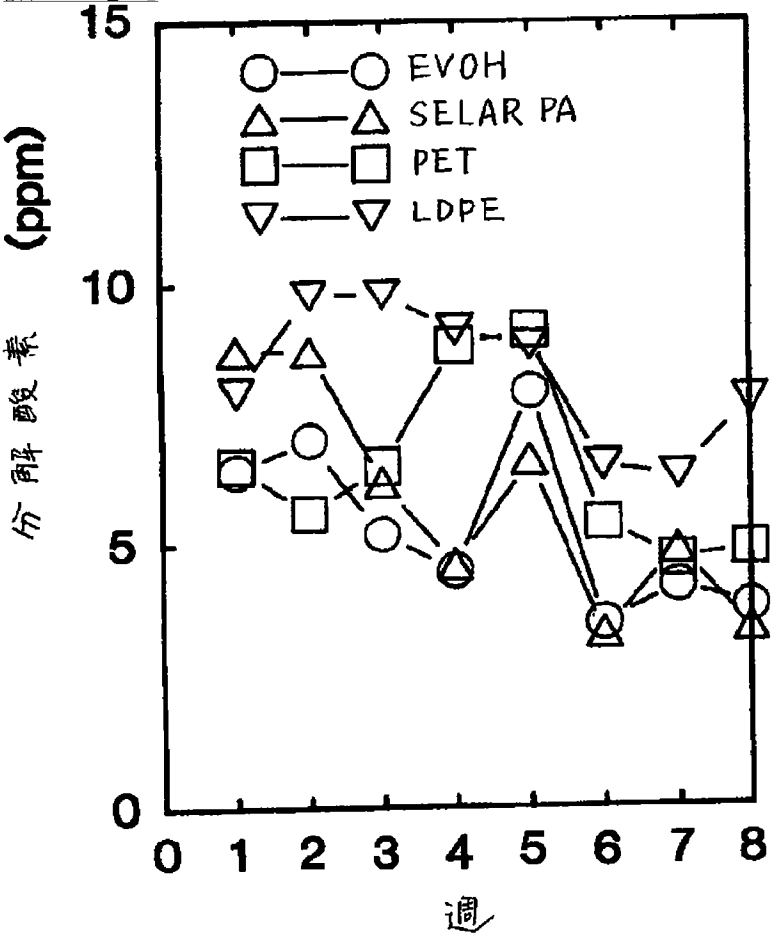
[Drawing 7]



[Translation done.]